Work Plan for Sampling at The Tri-State Mining Area Joplin, Missouri

TDD-R-07-8601-12

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SECTION 1 INTRODUCTION

Authorized under TDD #R-07-8602-12 The Ecology and Environment Field Investigation Team (E&E/FIT) was tasked by the Region VII office of the U S Environmental Protection Agency (EPA) to conduct a site investigation at Tri-State Mining District near Joplin, Missouri

The objective of this investigation is to obtain environmental samples at the Joplin Tri-State and Granby mining areas for the analysis of lead and zinc contamination These samples are needed for further documentation of the Hazardous Ranking System (HRS) analysis

SECTION 2 SITE HISTORY

Commercial development of the mineral resources of southwestern Missouri began about 1850 and spread into southeastern Kansas and northeastern Oklahoma, forming the Tri-State District with Joplin as the urban center The value of the Tri-State mineral production from 1850 to 1950 exceeded one billion dollars, and until 1945 the region was the world's leading producer of lead and zinc concentrates, accounting for one-half of the zinc and one-tenth of the lead produced in the United States By 1950 most of the rich ores had been extracted, and mining and milling operations declined during the 1950's and ceased in the 1960's (Ref 2)

The mining involved bringing the crude ores to the surface where they were milled into lead and zinc concentrates Barren rock was discarded in piles while the ore-bearing rock was crushed and ground into fine gravel The minerals were skimmed off and discarded in large piles (Ref 2)

Sphalerite (zinc sulfide) and galena (lead sulfide) were the most important minerals in the Joplin area Other minerals commonly associated with zinc and lead were pyrite, marcasite, dolomite, calcite, chert, and jasperoid (Ref 2)

Degradation of water quality is associated with the removal of these minerals from their reducing environment Oxidation of insoluble metallic-sulfide minerals in the mines and tailings to a soluble form and subsequent solution and hydrolysis of the soluble sulfates produces sulfuric acid and liberates metals However, neutralization of the acid by calcium carbonate in the rocks ultimately results in high concentrations of calcium, sulfate, and zinc in solution Because of their insolubility, most other metals are rapidly precipitated (Ref 2)

SECTION 3 SITE DESCRIPTION

The Missouri portion of the Tri-State Mining District comprises 6240 square kilometers (Ref 1) For the purpose of this study a four quadrangle area in the vicinity of Joplin will be investigated These quadrangles include Joplin West, Joplin East, Carl Junction, and Webb City This large area will be further divided into two drainage divides One divide will extend from Oronogo to Duenweg and include the Center Creek Drainage divide The other divide will be south of Joplin and include the Shoal Creek drainage area (Fig 1) A third area of concern will be the Granby mining area to the souteast of Joplin

The Oronogo-Duenweg area is a heavily mined area and contains numerous mine shafts and tailing piles The small towns in this area use the deep aquifer as their source of drinking water People living outside of these small towns use private wells set in the shallow aquifer The deep aquifer is separated from the shallow aquifer by the presence of impermeable shales of Mississippian and Devonian age (Ref 2) The major concern in this area is contamination of the shallow aquifer through the migration of contaminated surface waters into mine shafts and then to the groundwater

The Shoal Creek area is of particular concern because the City of Joplin obtains it's water from the Shoal Creek surface waters Joplin's intake is downstream from many tailing piles located in the Shoal Creek drainage basin (Ref 3)

An HRS analysis has been done on Tri-State mining area as one individual site This analysis was refused due to the unusually large size of the site and the lack of sample documentation It has been suggested that the site be broken up as mentioned above and scored as several smaller individual sites To score each of these sites an observed release to surface water and groundwater need to be documented Therefore, sampling efforts will be based upon this fact

SECTION 4 SAMPLING PLAN

Sampling at this site is based on the targeted approach which focuses on specific areas of the site most likely to have a potential for contamination These areas will include the groundwater and taken outside of the site boundary and in areas not heavily mined but geologically similar to the area within the boundary

The sampling effort in the Shoal Creek area will focus on a large chat pile located in the SE1/4 of Section 3, T26N, R33W Four sediment samples will be collected one directly downgradient in the drainage way, one midway from the chat pile to Shoal Creek, one at the point where the drainage way enters Shoal Creek, and one background sediment sample from the Shoal Creek upstream of the point where this drainage way enters Shoal Creek (Fig 3)

Following a reconnaissance of the affected mining areas near Granby, four sediment samples from the drainage path of Tailing Piles or flowing mine shafts will be collected An appropriate background sample will also be collected

Access to private properties will be done verbally at the time of sampling, therefore, sampling locations will depend on the cooperation of the residents All sample locations are subject to change at the discretion of the samplers

The entire sampling activity will be thoroughly documented to provide a record of the sample collection procedures, sampling locations, and chain-of-custody of collected samples The documentation will consist of field sheets, sample tags, chain-of-custody records, field notes and photographs, as appropriate

SECTION 5 SAMPLE SUMMARY

A total of forty samples will be collected by E&E/FIT, twenty sediment and twenty water These samples will be delivered to the EPA Region VII laboratory on March 3, 1986

Sample Type	Quantity	Container	Preservative	Analysis
Groundwater	18	1 qt cubie	5 ml 1 HNO cool, 4 C	Total metals
Sediment	19	8 oz wide mouth jar	cool, 4 C	Total metals
Duplicate	1 sediment	8 oz wide mouth jar	cool, 4 C	Total metals
	1 water	1 qt cubie	5 ml 1 1 HNO cool, 4°C	Total metals
Field Blank	1	1 qt cubie	5 ml 1 HNO cool, 4°C	Total metals

SECTION 6 PERSONNEL AND TENTATIVE SCHEDULE

The sampling effort at the Tri-State area is projected to require approximately five days beginning February 24, 1986 A two person crew from E&E/FIT will conduct the investigation and will be assisted by a two person crew from EPA Environmental Services (ENSV) The two crews will split up on the sampling effort to utilize time efficently

Day 1 (tentatively scheduled February 24, 1986)
4 Hours travel 2 E&E persons to Joplin
4 Hours on site sampling

Days 2,3 and 4 will be used for site reconnaissance and sampling all areas previously mentioned in work plan

Day 5 (tentatively schedule February 28, 1986)
4 Hours travel 2 E&E persons to Kanss City

It is anticipated that the sampling will be conducted in level D protection The samples will be delivered to the Region VII EPA laboratory on February 28, 1986 The regional EPA contact for the site is Shelley Brodie Jeff Weatherford is coordinating the ENSV team

REFERENCES

1) United States Department of The Interior, Bureau of Mines, Study of Stability Problems and Hazard Evaluation in The Missouri Portion of the Tri-State Mining Area, April, 1983, A Mining Research Contract Report

2) U S Geological Survey, Effects of Abandoned Lead and Zinc Mines and Tailings Piles on Water Quality in the Joplin Area, Missouri, Water-Resources Investigation 77-75, August 1977

3) U S Geological Survey, Webb City, Missouri, Quadrangle, 1963, 7 5 minute series Topographic Map

4) U S Geological Survey, Joplin West, Missouri, Quadrangle, 1962, 7 5 minute series Topographic Map

5) U S Geological Survey, Joplin East, Missouri, Quadrangle, 1963, 7 5 minute series Topographic Map

6) U S Geological Survey, Carl Junction, Missouri, Quadrangle, 1963, 7 5 minute series Topographic Map

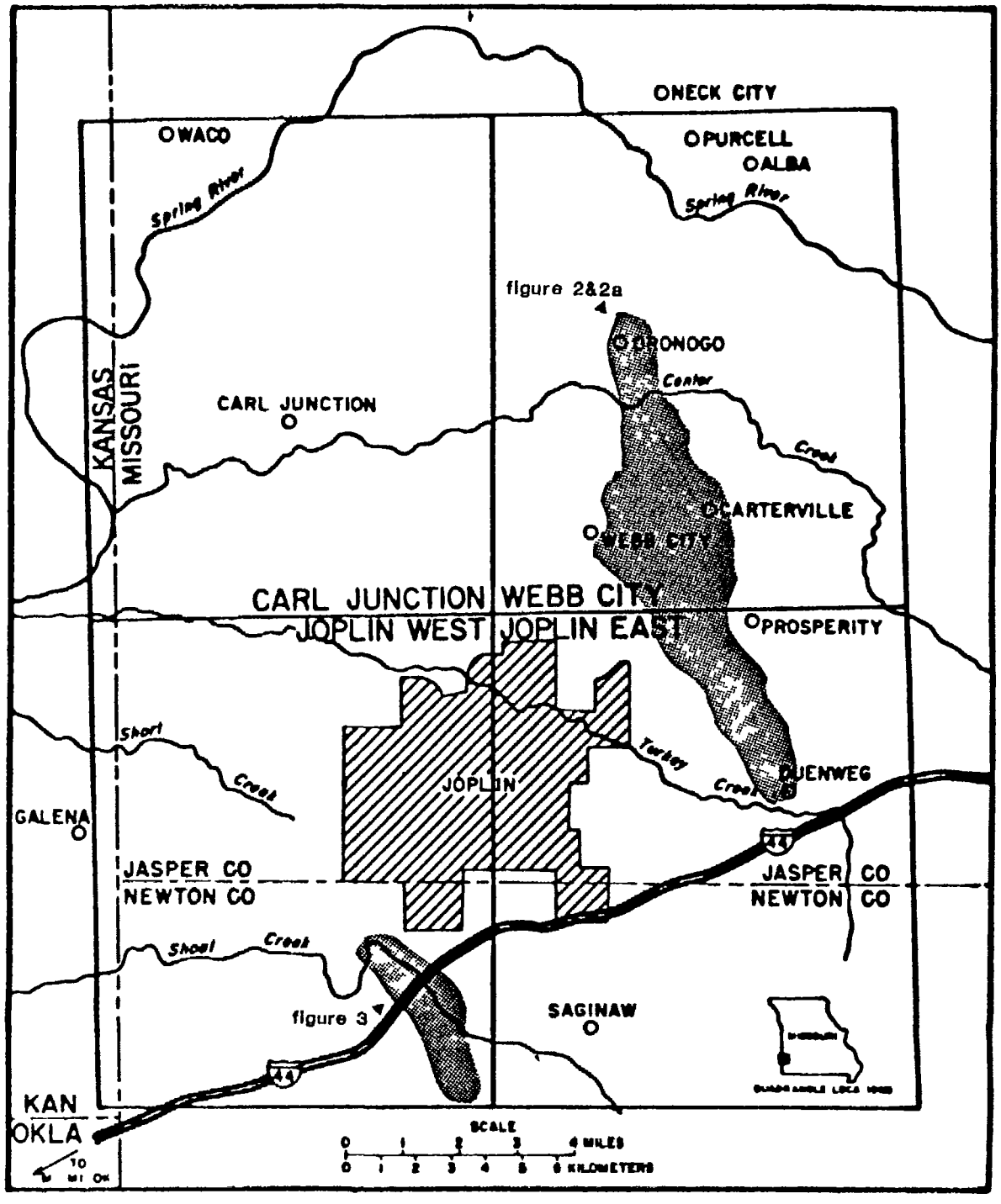


FIGURE 1 – Location map Missouri study area Tri-State District showing U.S G S quadrangle coverage (Ref 1)

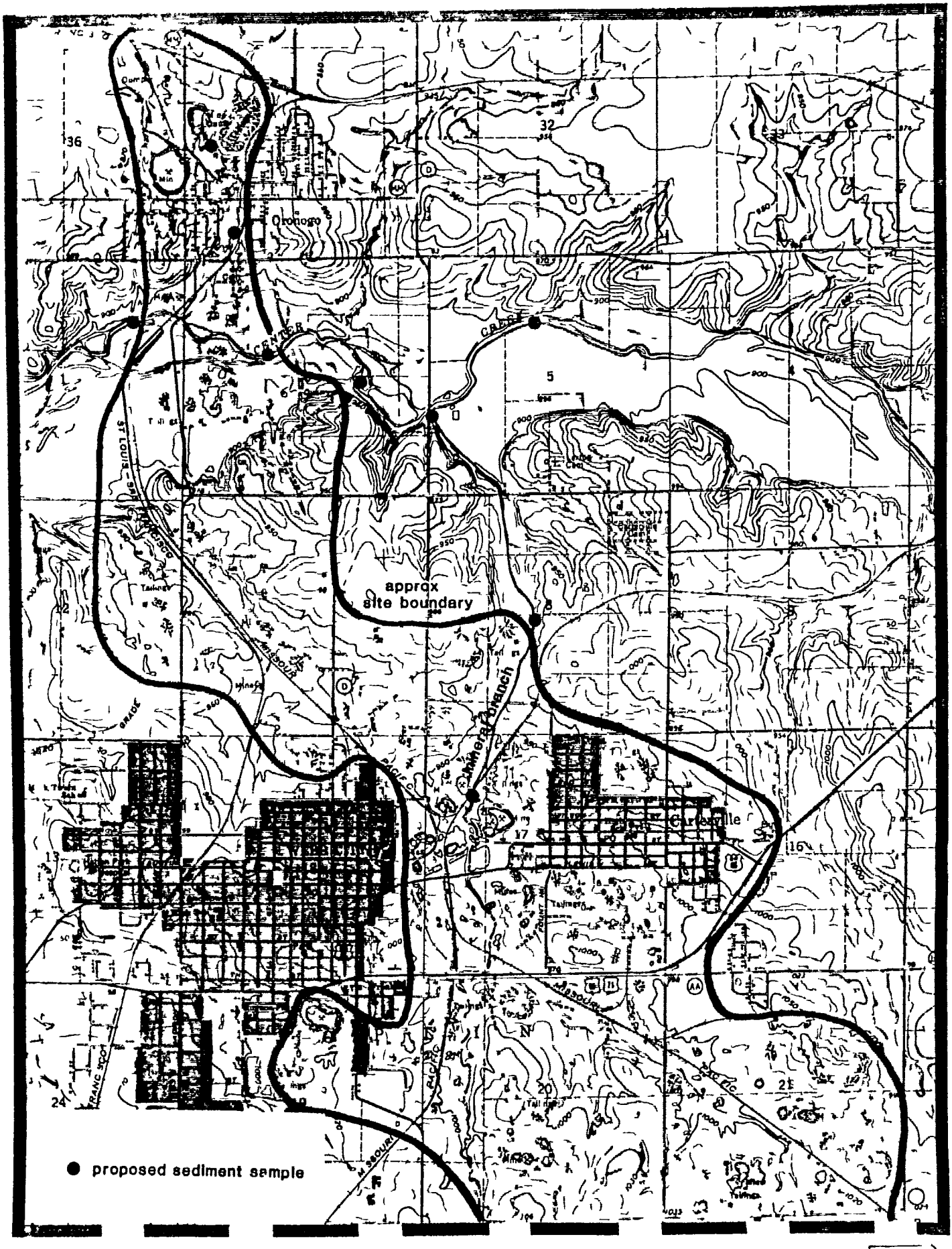
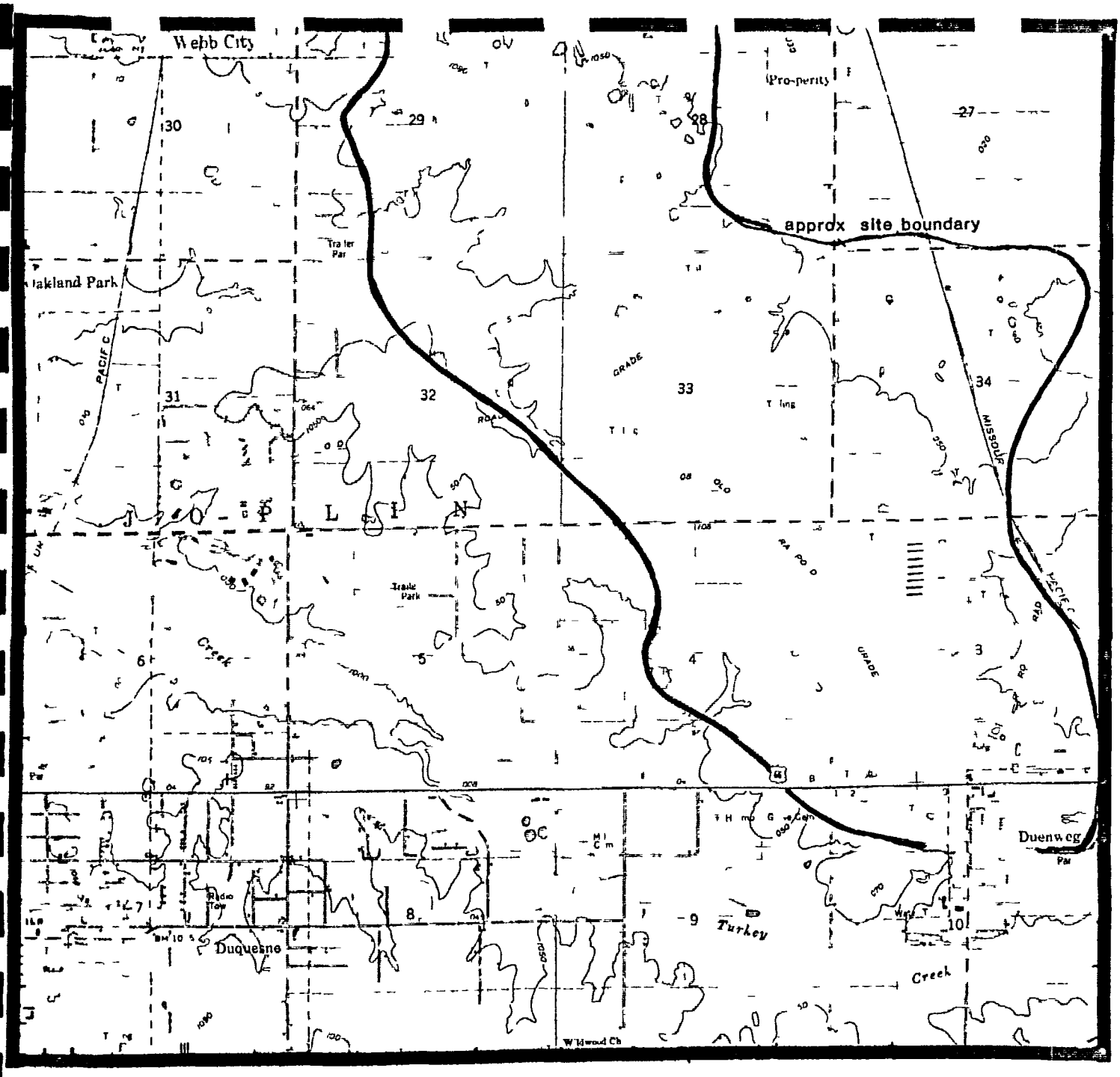

approx
site boundary
Carterville
Webb City
Turkey Creek
Shoal Creek
St Louis - San Francisco
proposed sediment sample
MN
7½
133 MILS
MISSOURI

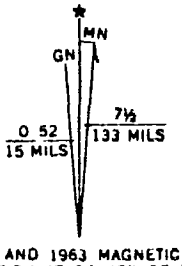
Figure 2

JOPLIN EAST, MO

N3700—W9422 5/7 5

1963
PHOTOREVISED 1978
AMS 7158 III SW—SERIES V879





UTM GRID AND 1963 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

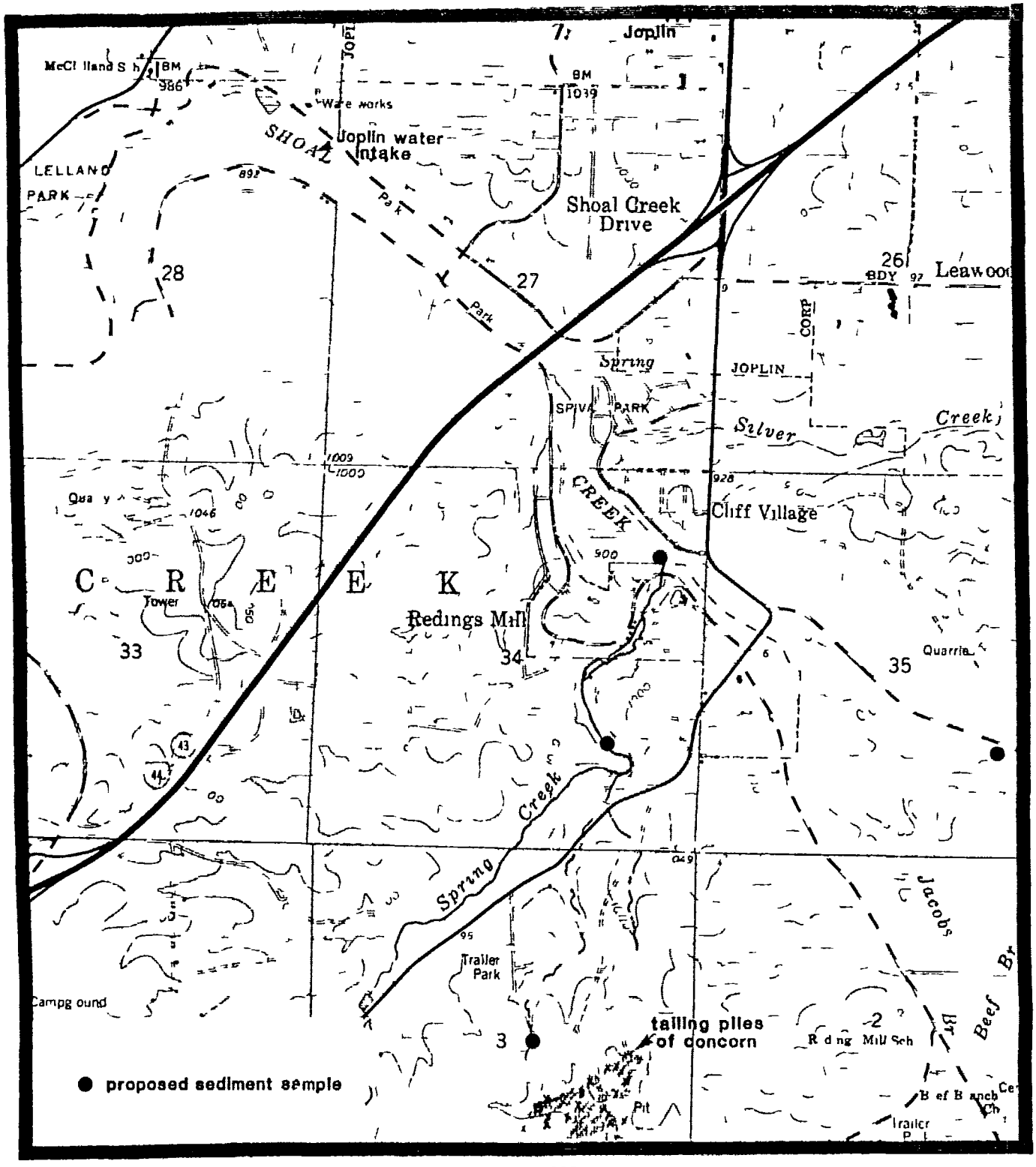
QUADRANGLE LOCATION

Figure 2a

JOPLIN WEST, MO – KANS

N3700—W9430/7 5

1962
PHOTOREVISED 1978



SCALE 1 24000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

GN 17 MILS 6¼ 116 MILS MN

MISSOURI

QUADRANG E LOCAT

Figure 3